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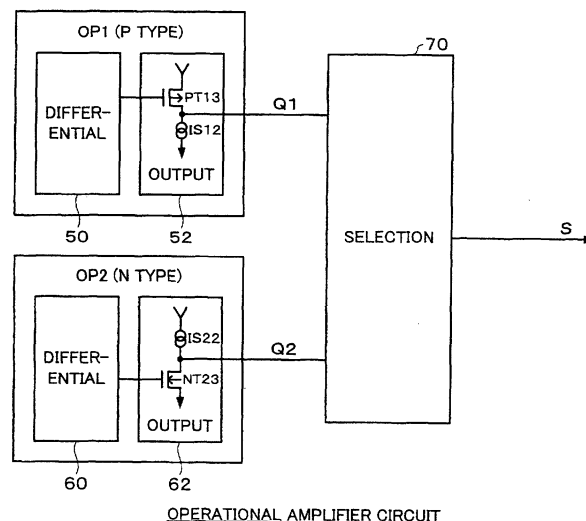
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(54) **Operational amplifier circuit, driving circuit and driving method**

(57) In a period T1 (positive polarity) in which a voltage level of a counter electrode VCOM becomes VC1, a data line is driven using P-type operational amplifier OP1 having P-type driving transistor, while in a period T2 (negative polarity) in which VCOM becomes VC2, the data line is driven using N-type operational amplifier OP2 having N-type driving transistor. An output of a selection circuit for the operational amplifiers OP1, OP2 is set to the high impedance state when VCOM is changed over. At the time of driving the operational amplifier OP1,

a current which flows in current sources of the operational amplifier OP2 is cut off, while at the time of driving the operational amplifier OP2, a current which flows in current sources of the operational amplifier OP1 is cut off. In the period before the operational amplifiers OP1, OP2 are driven, the driving transistors of the operational amplifiers OP1, OP2 are turned off. The voltage level of the data line can be changed before driving by positively utilizing the parasitic capacitance between the counter electrode and data line.

FIG. 7B





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EUROPEAN SEARCH REPORT

Application Number
EP 02 01 2196

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	GB 2 188 471 A (SHARP KK) 30 September 1987 (1987-09-30) * page 1, line 63; figures 2,9 * * page 3, line 49 - line 51 * * page 3, line 38 - line 46 *	1-5,7, 11-16	G09G3/36
A	US 6 172 663 B1 (OKADA HISAO ET AL) 9 January 2001 (2001-01-09) * column 10, line 37 - line 46; figures 1,8 * * column 15, line 8 - line 17 *	3	
E	EP 1 265 215 A (SEIKO EPSON CORP) 11 December 2002 (2002-12-11) * claim 6 *	9,10,17	
E	EP 1 265 216 A (SEIKO EPSON CORP) 11 December 2002 (2002-12-11) * claims 4,10 *	9,10,17	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			G09G
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 27 November 2003	Examiner Gundlach, H
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



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LACK OF UNITY OF INVENTION
SHEET B

Application Number
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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-8, 11-16

With regard to the cited prior art, in particular GB 2 188 471, claims 1 - 5, 7, 11 - 16 do not appear to be new and inventive. Remaining claim 6 concerns an operational amplifier circuit which drives each of data lines of an electro-optical device solving the problem how to optimize the structure of the operational amplifier circuit in order to save power whilst maintaining response speed and frequency characteristics.

2. Claims: 9, 10, 17

These claims concern an operational amplifier circuit and a driving method using this circuit. With regard to the cited prior art, in particular GB 2 188 471, the objective problem to be solved by these claims can be construed as how to optimize the structure of the operational amplifier circuit in order to save power in case of a parasitic coupling between the counter electrode and the data line.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 02 01 2196

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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27-11-2003

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